

Amendments to the Claims:

The listing of claims will replace all prior version, and listings, of claims in the application:

Listing of Claims:

Claims 1 – 21 (cancelled)

Claim 22 (currently amended): ~~The composition of claim 21,~~ A composition for the detection of high energy radiation comprising: a cerium doped lutetium yttrium orthosilicate mono crystal wherein the crystal includes: a monocrystalline structure of cerium doped lutetium yttrium orthosilicate, $Ce_{2x}(Lu_{1-y}Y_y)_{2(1-x)}SiO_5$ where $x =$ approximately 0.00001 to approximately 0.05 and $y =$ approximately 0.0001 to approximately 0.9999.

Claim 23 (previously presented): The composition of claim 22 wherein x ranges from approximately 0.0001 to approximately 0.001 and y ranges from approximately 0.3 to approximately 0.8.

Claim 24 (previously presented): A method of making a scintillation crystal comprising the steps of:

- (a) mixing Lu_2O_3 , Y_2O_3 , CeO_2 , SiO_2 together to form a mixture;
- (b) heating the mixture;
- (c) interacting the heated mixture with an LSO seed crystal; and
- (d) growing an LYSO crystal from the interaction.

Claim 25 (previously presented): The method of claim 24 wherein Lu_2O_3 is substantially pure.

Claim 26 (previously presented): The method of claim 24 wherein Y_2O_3 is substantially pure.

Claim 27 (previously presented): The method of claim 24 wherein SiO_2 is substantially pure.

Claim 28 (previously presented): The method of claim 24, wherein the heating step includes: heating the mixture to a molten state.

Claim 29 (previously presented): The method of claim 24, wherein the growing step includes: separating said LYSO crystal from the melt and cooling said LYSO crystal.

Claim 30 (previously presented): A crystal scintillator comprising a transparent single crystal of cerium-activated lutetium yttrium oxyorthosilicate having the general formula $\text{Lu}_{(2-x-z)}\text{Y}_x\text{Ce}_z\text{SiO}_5$, wherein $0.05 \leq x \leq 1.95$ and $0.001 \leq z \leq 0.02$.

Claim 31 (previously presented): The crystal scintillator of claim 30, wherein $0.2 \leq x \leq 1.8$.

Claim 32 (previously presented): The crystal scintillator of claim 31, wherein said scintillator has a luminescence wavelength of about 420 nm.

Claim 33 (previously presented): The crystal scintillator of claim 32, wherein said scintillator has a luminescence decay time of about 35-45 ns.

Claim 34 (previously presented): A scintillation detector, comprising:

- (a) A crystal scintillator comprising a transparent single crystal of cerium-activated lutetium yttrium oxyorthosilicate having the general formula $\text{Lu}_{(2-x-z)}\text{Y}_x\text{Ce}_z\text{SiO}_5$, wherein $0.05 \leq x \leq 1.95$ and $0.001 \leq z \leq 0.02$; and
- (b) A photodetector optically coupled to said crystal scintillator for detecting light from said crystal scintillator.

Claim 35 (previously presented): The detector of claim 34, wherein said photodetector comprises a photomultiplier tube.

Claim 36 (previously presented): The detector of claim 34, wherein said photodetector comprises a charge-coupled device.

Claim 37 (previously presented): A scintillation detector, comprising:

- (a) a crystal scintillator comprising a transparent single crystal of cerium-activated lutetium yttrium oxyorthosilicate having the general formula $\text{Lu}_{(2-x-z)}\text{Y}_x\text{Ce}_z\text{SiO}_5$, wherein $0.2 \leq x \leq 1.8$ and $0.001 \leq z \leq 0.02$; and
- (b) a photodetector optically coupled to said crystal scintillator for detecting light from said crystal scintillator.

Claim 38 (previously presented): The detector of claim 37, wherein said photodetector comprises a photomultiplier tube.

Claim 39 (previously presented): The detector of claim 37, wherein said photodetector comprises a charge-coupled device.